Claims

[1] A method of manufacturing a diamond tool having a shank and a plurality of abrasives attached thereto, comprising the steps of:
forming a plurality of concave portions in a surface of the shank; and
bonding a plurality of abrasives to an inner space of the concave portion.

[2] The method as claimed in claim 1, wherein the step of bonding a plurality of the abrasives to the inner space includes a brazing method.

[3] The method as claimed in claim 2, wherein the step of bonding a plurality of the abrasives to the inner space comprises the steps of:
preparing a mixture of a bonding material of paste form and a plurality of abrasives;
filling the mixture into the concave portion; and
heating the shank to thereby perform a fusion bonding.

[4] The method as claimed in claim 2, wherein the step of bonding a plurality of the abrasives to the inner space comprises the steps of:
filling a bonding material of paste form into the concave portion;
disposing a plurality of abrasives in the concave portion to be dispersed in the bonding material;
drying the bonding material; and
heating the shank to thereby perform a fusion bonding operation.

[5] The method as claimed in claim 1, wherein the step of bonding a plurality of the abrasives to the inner space comprises an electroplating method.

[6] The method as claimed in claim 5, wherein the step of bonding a plurality of the abrasives to the inner space comprises the steps of:
coating a non-conductive film onto the surface of the shank except the concave portions;
disposing a plurality of abrasives in the concave portion; and
electroplating the shank.

[7] The method as claimed in claim 6, further comprising the step of removing the non-conductive film.

[8] The method as claimed in any one of claims 1 to 7, wherein the step of bonding a plurality of the abrasives to the inner space further comprises the step of disposing the abrasive in such a way that the abrasive protrudes from the surface of the shank.

[9] The method as claimed in any one of claims 1 to 7, further comprising the step of bonding a plurality of abrasives onto the top of the concave portion, to which the abrasives and bonding material are bonded, and onto the surface of the shank.

[10] The method as claimed in claim 9, wherein the step of bonding a plurality of the abrasives onto the top comprises the steps of:
coating a bonding material of paste form on the top of the concave portion and on the surface of the shank;
dispersing a plurality of abrasives in the bonding material,
drying the second bonding material; and
heating the shank to thereby perform a fusion bonding operation.

[11] The method as claimed in any one of claims 1 to 5 and 7, further comprising the step of bonding a plurality of abrasives onto the surface of the shank and onto the top of the concave portion, to which the abrasives and bonding material are bonded, wherein the step of bonding a plurality of the abrasives onto the surface of the shank and onto the top of the concave portion comprises the steps of disposing a plurality of abrasives on the top of the concave portion and on the surface of the shank; and electroplating the shank.

[12] A method of manufacturing a diamond tool having a shank and a plurality of abrasives attached thereto, comprising the steps of:
forming a plurality of concave portions in a surface of the shank;
filling a bonding material of paste form and a plurality of abrasives into the concave portion;
coating a bonding material of paste form on the top of the concave portion, to which the filled bonding material and abrasives are bonded, and onto the surface of the shank;
dispersing a plurality of abrasives in the bonding material;
drying the bonding materials; and
heating the shank to thereby perform a fusion bondingoperation.

[13] The method as claimed in claim 12, further comprising the step of drying the bonding material within the concave portion before the step of coating the bonding material.

[14] The method as claimed in any one of claims 2 to 4, 12 and 13, wherein the fusion bonding operation is carried out within a batch type vacuum furnace, a reduction/ inert gas atmosphere furnace, or a continuous gas atmosphere furnace using a conveyor.

[15] The method as claimed in claim 10, wherein the fusion bonding operation is carried out within a batch type vacuum furnace, a reduction/inert gas atmosphere furnace, or a continuous gas atmosphere furnace using a conveyor.

[16] A diamond tool having a shank and a plurality of abrasives attached thereto, wherein a plurality of concave portions are formed in a surface of the shank and a plurality of abrasives are bonded into the concave portions.

[17] The diamond tool as claimed in claim 16, wherein the concave portion includes a dimple type one and a groove type one.

[18] The diamond tool as claimed in claim 17, wherein a cross section of the concave portion taken along a direction perpendicular to the surface of the shank includes a semicircular shape, a semi-elliptic shape, a U-shape, a V-shape, or a wavy shape.

[19] The diamond tool as claimed in claim 16, wherein a wall between the concave portions has a rounded upper end edge.

[20] The diamond tool as claimed in claim 16, wherein the concave portion includes a through-hole type concave portion.

[21] The diamond tool as claimed in claim 16, wherein a groove is formed in a main cutting face of the shank and a through-hole is formed in a sub-cutting face of the shank.

[22] The diamond tool as claimed in any one of claims 16 to 21, wherein a ratio (s/w) of the spacing (s) between the concave portions to the width (w) of the concave portion is within a range of 0.2 to 0.8.

[23] The diamond tool as claimed in any one of claims 16 to 21, wherein a ratio (w/s) of the width (w) of the concave portion to the maximum diameter (a) of the abrasive is greater than 0.25.

[24] The diamond tool as claimed in any one of claims 16 to 19, wherein a ratio (d/a) of the depth (d) of the concave portion to the maximum diameter (a) of the abrasive is greater than 0.25.

[25] The diamond tool as claimed in to any one of claims 16 to 20, wherein a plurality of abrasives is bonded onto the top of the concave portion, to which the abrasives and bonding material are bonded, and onto the surface of the shank.

[26] The diamond tool as claimed in claim 25, wherein the protruding height of the plurality of abrasives bonded to the top of the concave portion and the surface of the shank is varied.

[27] The diamond tool as claimed in any one of claims 16 to 20, wherein a protruding height of the abrasives is varied.

[28] The diamond tool as claimed in any one of claims 16 to 20, wherein the diamond tool includes a saw, a core drill, a cutter, a saw blade, a wire saw, a polishing cup, a profiler, an end mill, a straight wheel, an ID wheel, a rotary dresser, and an edge grinding wheel.

[29] The diamond tool as claimed in any one of claims 16 to 20, wherein the abrasive includes synthetic and natural diamond, cubic boron nitride (cBN), silicone carbide, alumina, and a mixture of at least two thereof.